[0554] In the course of setting up a scene for shooting, the lighting is often adjusted to highlight specific areas or subject matter or, in other cases, reduced to create texture or shadow. In the traditional process, lights are physically adjusted, aimed, focused and filtered to get the desired effect. In this embodiment, LED-based lights are set up in a general pattern, perhaps covering an entire area or set, and then the cinematographer or director can command more or less light, or specific color in particular areas and the array of fixtures can be set to produce the required effect. This embodiment provides great flexibility and control. As shown in **FIG. 106**, a scene is lit with a number of LED fixtures. These are networked, addressable fixtures (e.g., see U.S. Pat. No. 6,016,038) and all are connected to power and data. This setup can be used in several ways as discussed below.

[0555] The scene can be modeled in 3D by directly modeling the environment in a CAD or drawing package and the lighting positions can be built into that model as well. In this way a scene can be simulated ahead of time or changed during the shoot itself by controlling the virtual model and then having the physical light correspond to the model. Thus, the set can be controlled directly from the model.

[0556] In a situation where the physical manifestation of the set is not previously modeled, a camera system can be used to capture the relative or absolute position of the illumination on the set through the use of a 3D capture system using computer vision techniques. This is similar to the system described in U.S. patent application Ser. No. 10/163,164, filed Jun. 5, 2002, entitled "Systems and Methods of Generating Control Signals," which application is hereby incorporated herein by reference. Once such a model is determined, the representation can be used in the above scenario. A series of lights can be activated in a sequential manner to light up various aspects of the scene. Each light, in turn, is activated to give information about its relation to the scene and specifics of its illumination of the scene through the camera system. This modeling system need not be the same camera **10252** used for the final shooting. In this way, active control of lighting to the point where a director can say "put a little more light here," can be translated into direct control of the light.

[0557] Another approach is to use the live image and, with the lighting model in place, use the computer I/O (keyboard, joysticks, touch screen, trackball or the like) to indicate areas and provide user input to change lighting parameters for that particular region through the user interface. In **FIG. 107**, such a system is shown. The computer **10752** shows the camera view on the monitor as well as the design program to both allow the user to indicate commands through I/O and to command the lighting systems **100**. Specifically, the lighting corresponding to a specific region can be labeled or indicated and the user can then control the lighting via on-screen controls or separate I/O to change brightness or color of the lighting.

[0558] Digital cameras **10252** have digital interfaces for uploading and downloading images to computers, printers, memory storage device. They also provide for mechanical loading of memory (CompactFlash, Sandisk etc). These interfaces can be extended to provide sensing and lighting control facilities **3500**. This can be accomplished though standard networks and protocols such as Firewire (IEEE

1394), USB, Bluetooth, or Ethernet. More generally, protocols might include Internet Protocol and physical connections may be wired serial connections, wireless RF connections, IR and other standard means for communicating data.

[0559] An embodiment of the present invention relates to the coupling of camera imaging sensing and actions relating to the control of lighting to produce a desired effect, including color balancing using the imaging device or lighting. Indicators or controls can be provided on the camera to dial in desired color temperatures via manual control or allow the camera **10252** to do that automatically. In particular the camera **10252** can provide imaging and then analysis (color balancing, histogram analysis, standard image analysis etc) and then determine the best setting for lighting to adjust color balance. This information can then be sent over a communication link to the lighting system **100**.

[0560] In embodiments a signal source **8400**, such as a sensor can be provided. The sensing device can be the imaging sensor itself. A calibrated imaging sensor can provide accurate feedback and even, internal to the camera **10252**, provide image analysis for setting up appropriate offsets, adjustments and even, through a feedback system, control of external devices, such as lighting, that permit change within the scene. The digital camera **10252** can then be used as a platform for image analysis and control of lighting systems **100** to optimize image color, brightness, saturation levels and more.

[0561] Color proofing is the process of creating a faithful rendition of color to result in a printed image that is accurate. Digital cameras **10252** can have high sensitivity to light, but this can result in poor color saturation. One of the advantages of an LED lighting system **100** is a natural coupling or correspondence to the RGB elements in a CCD or CMOS imaging array or other imaging chips. That is, the spectrum emitted by the LED narrow band emitters is a good match for the spectral sensitivity of the imaging elements of the imaging chips. The saturated colors can work with the imaging device to provide and fill the saturation necessary for a good image while still providing the low light sensitivity. Thus, lesser amounts of light can be necessary through the use of lighting that provides good saturated color output and control. The adjustments of color are similarly a natural match to the output of the imaging device, and calibration can be provided through a feedback loop either through the camera or a separate device.

[0562] Color correction and image adjustments are often made in software applications, such as Photoshop, which provide many tools for editing the image. These features include color correction, brightness adjustments, touch-ups, editable compositing, masking, cropping and much more. Additional functionality is often provided through software plug-in modules that add editing features as well as communication with external devices such as scanners, cameras and other devices.

[0563] Once post-production touch up and editing occurs there is a loss of information from the original image. One of the primary advantages of evaluating the image and then adjusting the lighting in situ is that information is preserved and subsequently post-production work is reduced. Fundamentally, the advantage of this system is the reduction of the post-production work by controlling the outcome through lighting prior to the final version.